

REMARKS

The applicants appreciate the Examiner's thorough examination of the application and request re-examination and reconsideration of the application in view of the preceding amendments and following remarks.

The Examiner rejects claims 1-3, 9, 11, 13, 15-17, 19, 21-22, 34-36, 38-41, 44-45 under 35 U.S.C. 102(b) as allegedly being anticipated by Zdeblick.

The applicants' claimed integrated electrofluidic system as recited in amended claim 1 includes: 1) a support platform including a plurality of laminated layers; 2) an electronic control system mounted on the support platform; 3) a microfluidic system embedded in and formed by the plurality of laminated layers including a) an input and an output for receiving and dispensing a fluid and b) one or more electrofluidic components, the one or more electrofluidic components including at least one channel for providing fluidic communication between said one or more electrofluidic components and 5) at least one electrical conductor carried by said platform for electrically interconnecting said electronic control system and said at least one electrofluidic component. Independent claims 38, 40, and 44 recite similar features.

The claimed integrated electrofluidic system as recited in claim 1 includes a support platform that includes a plurality of laminated layers, e.g., laminated layers 60, 62, 64, and 66 as shown in Fig. 2A of the applicants' specification. The claimed microfluidic system is embedded and formed by the plurality of laminated layers and includes an input, e.g., input 38, and an output, e.g., output 40, for receiving and dispensing fluid, and one or more electrofluidic components, e.g., pump 42, check valves 44 and 46, channels 49, 51, and 53, reservoir 48, and mixer 50. The one or more electrofluidic components as recited in claim

1 include at least one channel, e.g., channels 49, 50 and 53 that provide fluidic communication between the various electrofluidic components. The claimed at least one channel efficiently circulates fluid over the various surfaces of the electrofluidic components, e.g., as shown by arrows 33, 35, 37, and 39 in Fig. 2A of the applicants' specification to efficiently provide fluidic communication between the various electrofluidic components. Such fluidic communication between the various electrofluidic components eliminates the need for microtubules. Eliminating microtubules significantly decreases production costs and improves reliability of the claimed integrated electrofluidic system. Thus, the claimed integrated electrofluidic system decreases production costs, improves the reliability and requires less fluid than conventional microsystems.

In contrast, Zdeblick fails to teach, suggest, or disclose a microfluidic system embedded in and formed by the plurality of laminated layers that includes an input and output for receiving and dispensing a fluid and one or more electrofluidic components including at least one channel for providing fluidic communication between the one or more fluidic components.

Instead, Zdeblick teaches and discloses a membrane chamber that is defined by four walls which clearly have a fixed volume that cannot receive an input or dispense an output of a fluid as shown by:

The volume of membrane chamber 10 is fixed except when the membrane 18 flexes. A fixed quantity of a gas or fluid is sealed in the membrane chamber 10. This may be done during the sealing of the membrane chamber by bonding a pyrex wafer 22 to the top surface of the wafer, i.e., the surface of the wafer 12 having the most positive z coordinates and normal to the z axis.

Col. 6, line 64-Col. 7, line 2 (emphasis added).

Clearly, Zdeblick teaches and discloses a member chamber with a fixed volume that cannot possibly include the applicants' claimed microfluid system embedded in and formed by a plurality of laminated layers that includes an input and an output for receiving and dispensing a fluid. The fixed volume of chamber 10 also prevents inclusion of an electrofluidic component that includes at least one channel for providing fluidic communication between one or more electrofluidic components.

Therefore, for at least the reasons disclosed above, Zdeblick does not teach, suggest, or disclose each and every element of the applicants' invention as recited in independent claims 1, 38, 40, and 44, namely, a microfluidic system embedded and formed by the plurality of laminated layers including an input and an output for receiving and dispensing of fluid and one or more electrofluidic components including at least one channel for providing fluidic communication between the one or more electrofluidic components.

Accordingly, applicants' independent claims 1, 38, 40, and 44, are patentable and allowable under 35 U.S.C. 102(b) over Zdeblick. Because dependent claims 2, 3, 9, 11, 13, 15-17, 19, 21-22, 34-36, 39, 41, and 45 depend from allowable base claims, these claims are allowable and patentable over Zdeblick.

The Examiner rejects claims 10, 12, 14, 18, 20, 23-33 and 42-43 under 35 U.S.C. §103(a) as being unpatentable over Zdeblick. The Examiner also rejects claims 5-8 under 35 U.S.C. §103(a) as being unpatentable over Zdeblick in view of Bergstresser *et al.*

As shown above, Zdeblick fails to teach, suggest or disclose each every element of the applicants' invention as recited in applicants' independent claims 1, 38, 40, and 44. Bergstresser *et al.* also fails to teach, suggest or disclose a microfluidic system embedded and formed by the plurality of laminated layers including an input and an output for receiving and dispensing of fluid and one or more electrofluidic components including at

least one channel for providing fluidic communication between the one or more electrofluidic components as recited in applicants' independent claims 1, 38, and 40.

Accordingly, applicants' independent claims 1, 38, 40, and 44, are patentable and allowable under 35 U.S.C. 102(b) over Zdeblick in view of Bergstresser *et al.* Because claims 5-8, 10, 12, 14, 18, 20, 23-33, and 42-43 depend from allowable base claims, the Examiner's rejections of these claims under 35 U.S.C. §103(a) is traversed.

The Examiner rejects claims 1 and 37 under 35 U.S.C. §102(e) as being anticipated by Morse *et al.*

Morse *et al.* fails to teach, suggest, or disclose a microfluidic system embedded and formed by the plurality of laminated layers including an input and an output for receiving and dispensing of fluid and one or more electrofluidic components including at least one channel for providing fluidic communication between the one or more electrofluidic components and at least one electrical conductor carried by the platform for electrically interconnecting the electronic control system and the electrofluidic component.

Instead, Morse *et al.* teaches a resistive heater element (4) disposed between a nanoporous flow host structure and a manifold support beam. An air flow path (50) and a fuel path (52) enable heat transfer characteristics between a fuel cell package and a fuel storage reservoir. Clearly, the fuel cell of Morse *et al.* does not receive and dispense fluid to one or more electrofluidic components for providing fluidic communication between the one or more electrofluidic components.

Moreover, nowhere in the entire disclosure of Morse *et al.* is there any teaching, suggestion, or disclose of an electrical conductor carried by the platform for electrically interconnecting the electronic control system and the one or more electrofluidic components.

Accordingly, applicants' independent claim 1 is allowable and patentable under 35 U.S.C. 102(e) over Morse *et al.* Because claim 37 depends from claim 1, claim 37 is also allowable and patentable over Morse *et al.*

The Examiner rejects claims 1-4 under 35 U.S.C. 102(e) as being anticipated by Barth *et al.*

Barth *et al.* fails to teach, suggest, or disclose a microfluidic system embedded and formed by the plurality of laminated layers including an input and an output for receiving and dispensing a fluidic and one or more fluidic components including at least one channel for providing fluidic communication between said one or more electrofluidic components.

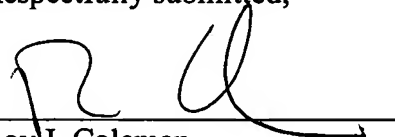
Instead, Barth *et al.* teaches and discloses a fluid handling system which is fed from a plurality of reservoirs which deposits hundreds of different fluids in the form of drop-on-demand droplets onto substrates. The fluid handling system of Barth *et al.* utilizes a microtiter manifold, a reservoir, liquid access holes and a capillary between two sheets to deliver fluid to a deposition chip (108) which carries the ejection means (110). *See, e.g.,* Col. 4, line 40 – Col. 5, line 6. In operation, a droplet is ejected by the fluid handling system through a passthrough hole by the ejection means 110 mounted on deposition chip 108. The droplet is then deposited on a substrate: "In operation, a droplet 144, which has a typical volume of 35 picoliters (p1), is ejected from the fluid handling system 100 through droplet passthrough hole 142 after being ejected from the orifice 138 by ejection means 110." (Col. 5, lines 7-10) Nowhere in the entire disclosure of Barth *et al.* is there any teaching, suggestion, or disclosure of a microfluidic system embedded and formed by the plurality of laminated layers including an input and an output for receiving and dispensing a fluidic and one or more fluidic components including at least one channel for providing fluidic communication between said one or more electrofluidic components.

Accordingly, claim 1 is allowable and patentable under 35 U.S.C. 102(e) over Barth *et al.* Because claims 2-4 depend from an allowable base claim, these claims are allowable and patentable under 35 U.S.C. 102(e) over Barth *et al.*

Each of the Examiner's rejections has been addressed or traversed. Accordingly, it is respectfully submitted that the application is in condition for allowance. Early and favorable action is respectfully requested.

If for any reason this Response is found to be incomplete, or if at any time it appears that a telephone conference with counsel would help advance prosecution, please telephone the undersigned or his associates, collect in Waltham, Massachusetts, at (781) 890-5678.

Respectfully submitted,



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